

# ***Headquarters U.S. Air Force***

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## **Air Force Standard Analysis Toolkit and Analysis Approach**



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# Outline

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  - What is it?
  - Why Created?
  - Approach used to develop AFSAT?
  - Process used for M&S tool to enter AFSAT?
- **SURVIAC Description**
- **Relationship between AFSAT and SURVIAC**
- **Ex. Analysis approach using AFSAT/SURVIAC tools**
- **Summary**



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# ***AFSAT Description***

***What is it?***

- The Air Force Standard Analysis Toolkit (AFSAT)
- Foundational set of AF analytic community (AFAC) accepted modeling and simulation (M&S) tools
  - Stand-alone, data driven constructive simulations
  - User picked, well understood, formally evaluated (stamp of approval)
  - Use of AFSAT tools encouraged
- Goals
  - Improve consistency and quality of AF analyses
  - Standardize model management, configuration management, VV&A, etc. *best practices* across the AF analytic community
  - Provide framework for analytic M&S capability investments
- Oversight
  - AFAC Steering Group provides direction and guidance
  - AFSAA/SAA – executive agent
  - Subject Matter Expert model managers (MM) responsible for individual models

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# AFSAT Description

*Why Created?*

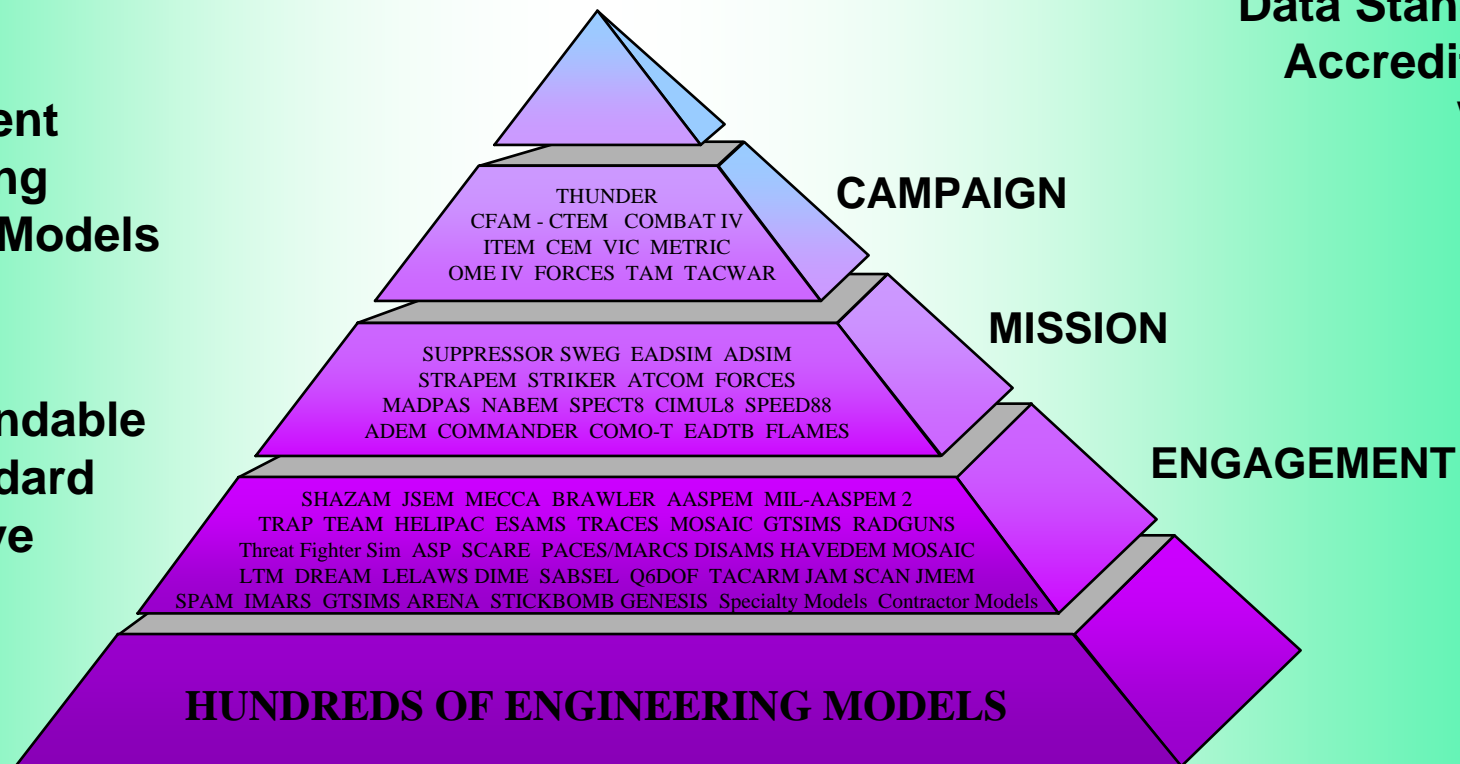
## Numerous Analysis Tools

Campaign  
Mission  
Engagement  
Engineering  
Specialty Models

Mandates  
Data Standards  
Accreditation  
VV&A

## Issues

Non-Defendable  
Non-Standard  
Duplicative



**Analysis**

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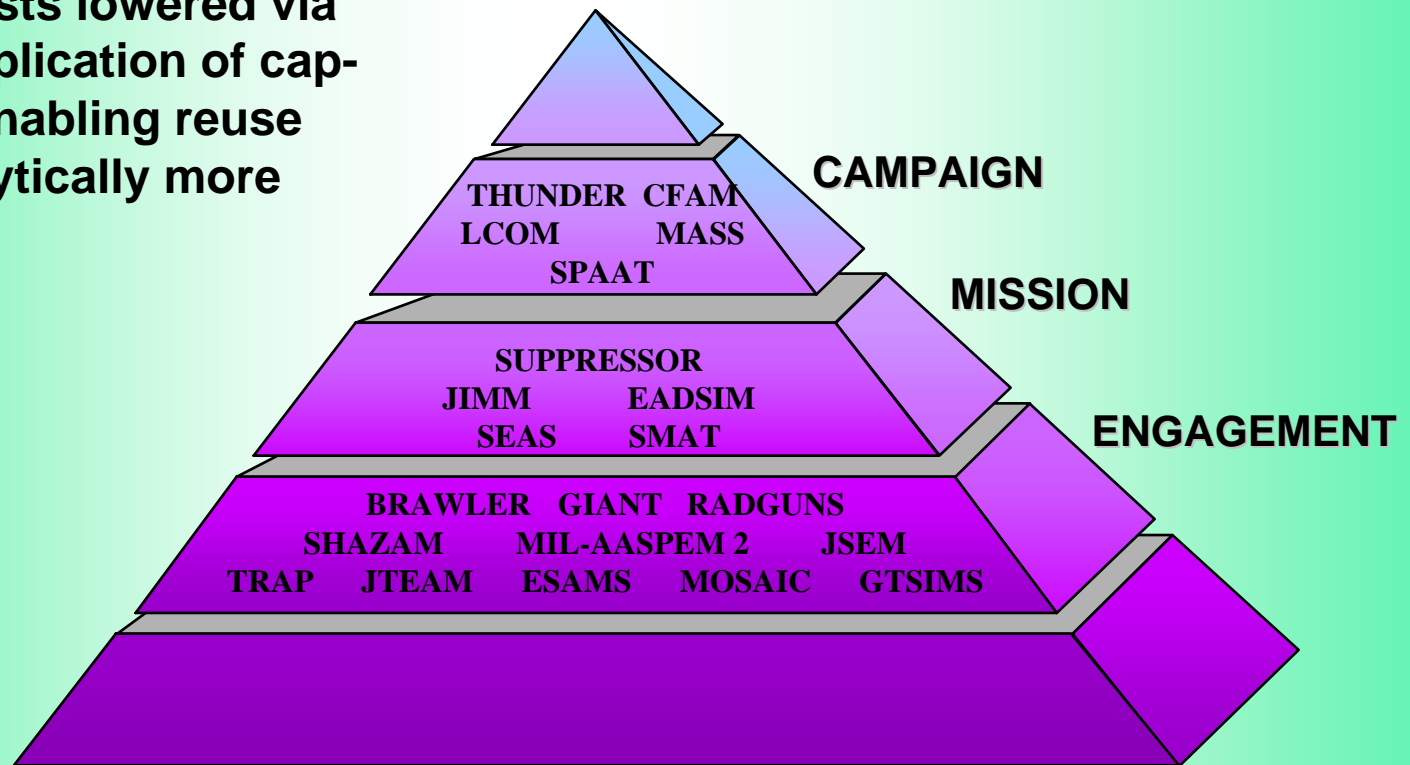
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# AFSAT Description

## Approach used?

### AF Analyses Benefits

Life cycle costs lowered via  
reduced duplication of cap-  
ability via enabling reuse  
Results analytically more  
consistent



**Analysis**

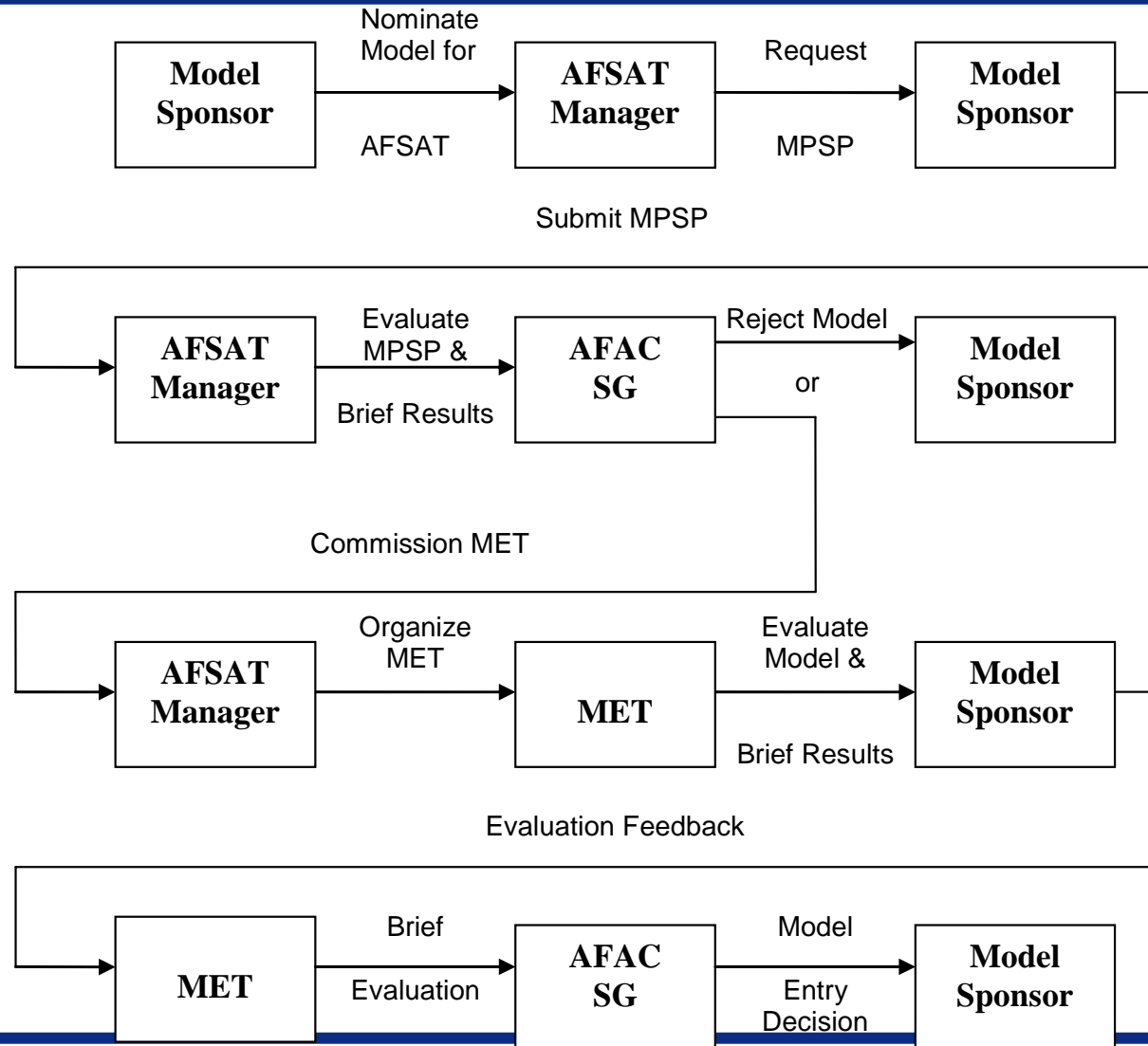
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# AFSAT Description

## Entry Process per AFI 16-1003



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# ***SURVIAC Description***

## ***Survivability/Vulnerability IAC***

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- DoD sponsored Information Analysis Center (IAC)
- DoD's institution for collecting, analyzing, and disseminating scientific and technical information (STI) related to all aspects of survivability and lethality for aircraft, ground vehicles, ships and spacecraft, to conventional homeland security threats including chemical, biological, directed energy, and non-lethal weapons.
- Contractor operated, DoD sponsored service available to all government and industry users to provide studies, analyses, data gathering, and other operational, and logistics requirements related to survivability and lethality technologies.
- Includes maintenance and distribution of approved set of models and simulations used to evaluate survivability and vulnerability.



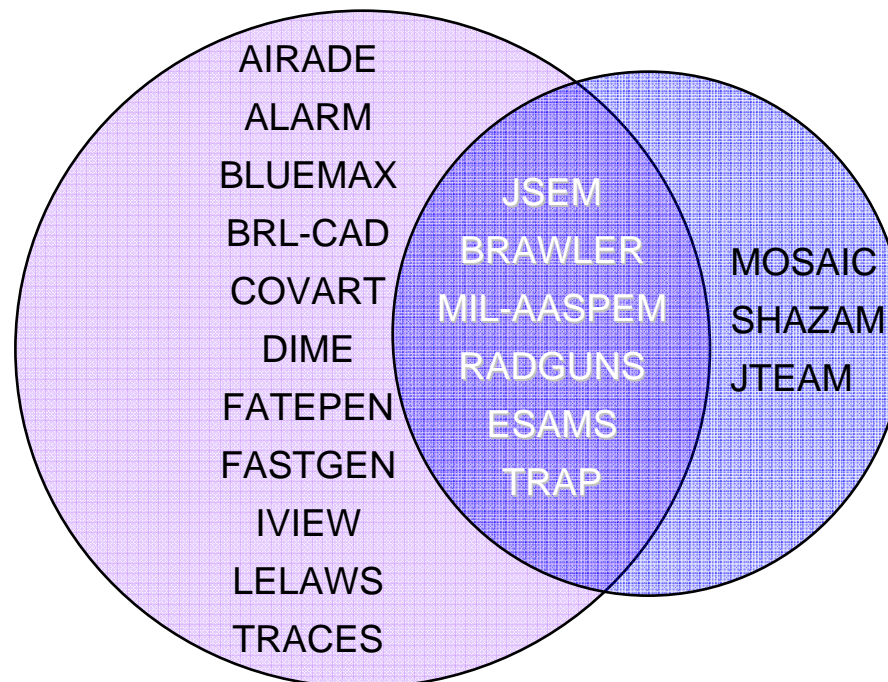


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# ***AFSAT and SURVIAC M&S***

***How are they related?***

**SURVIAC**



**AFSAT**  
Engagement  
Level Models

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# Aircraft Survivability

*Where the Rubber Meets the Road*

Work backwards—understand the physics and effects



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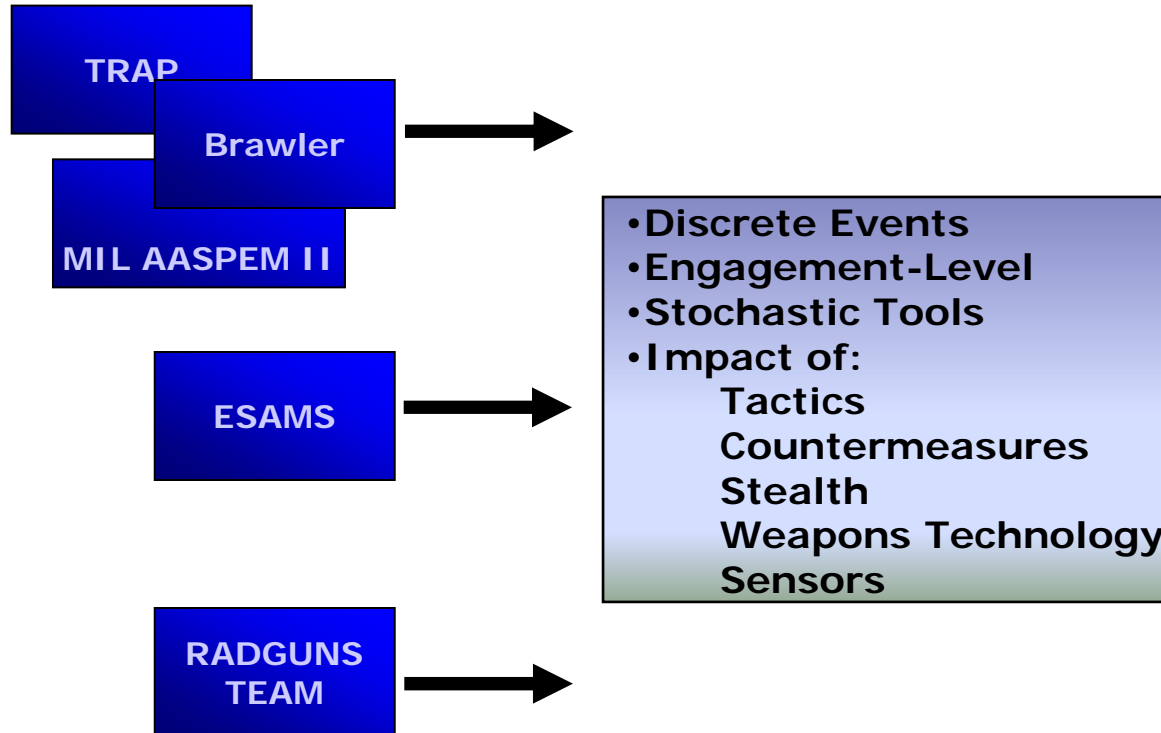
GERALD BENNETT, SURVIAC



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# Survivability & Vulnerability

## Engineering & Engagement Level Analysis



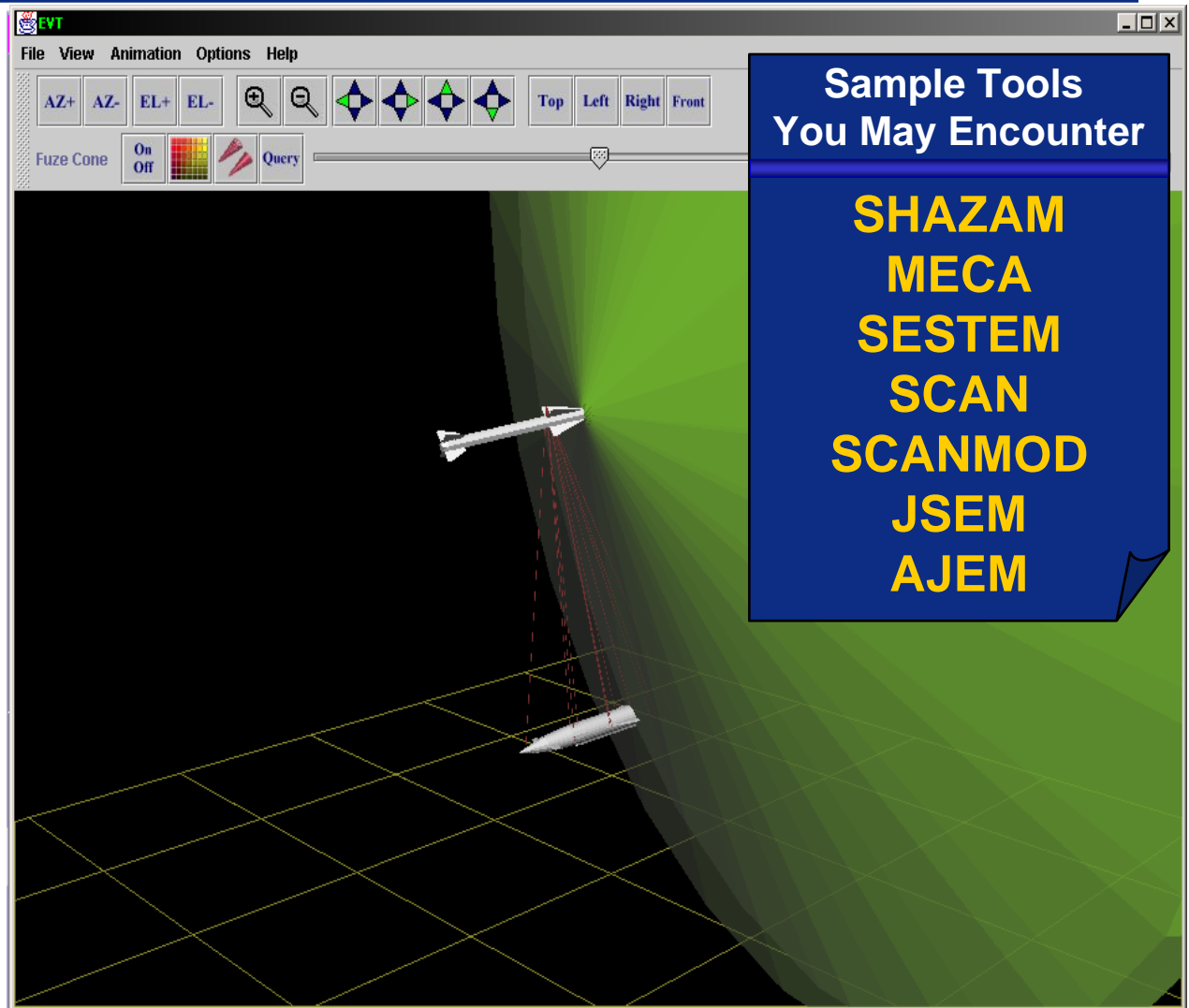


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# Engineering-Level

## *The Munitions: Endgame*

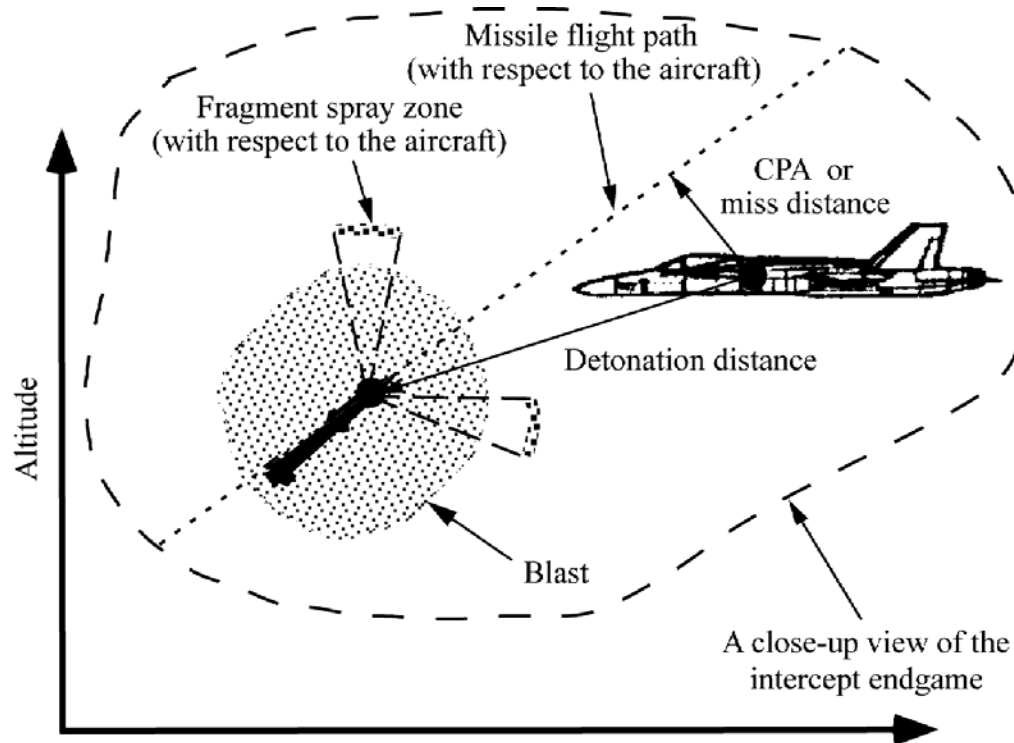
- Terminal effectiveness of fragmenting munitions
- 3D terminal-encounter simulation
  - Last few milliseconds (fuzing/warhead interaction)
- Calculates aerial target kill by threat missile (Pkss)
- Accounts For Major Damage Mechanisms
  - Direct Hit
  - External Blast
  - Warhead Frag





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# Engineering-Level Summary



**HUNDREDS OF ENGINEERING MODELS**

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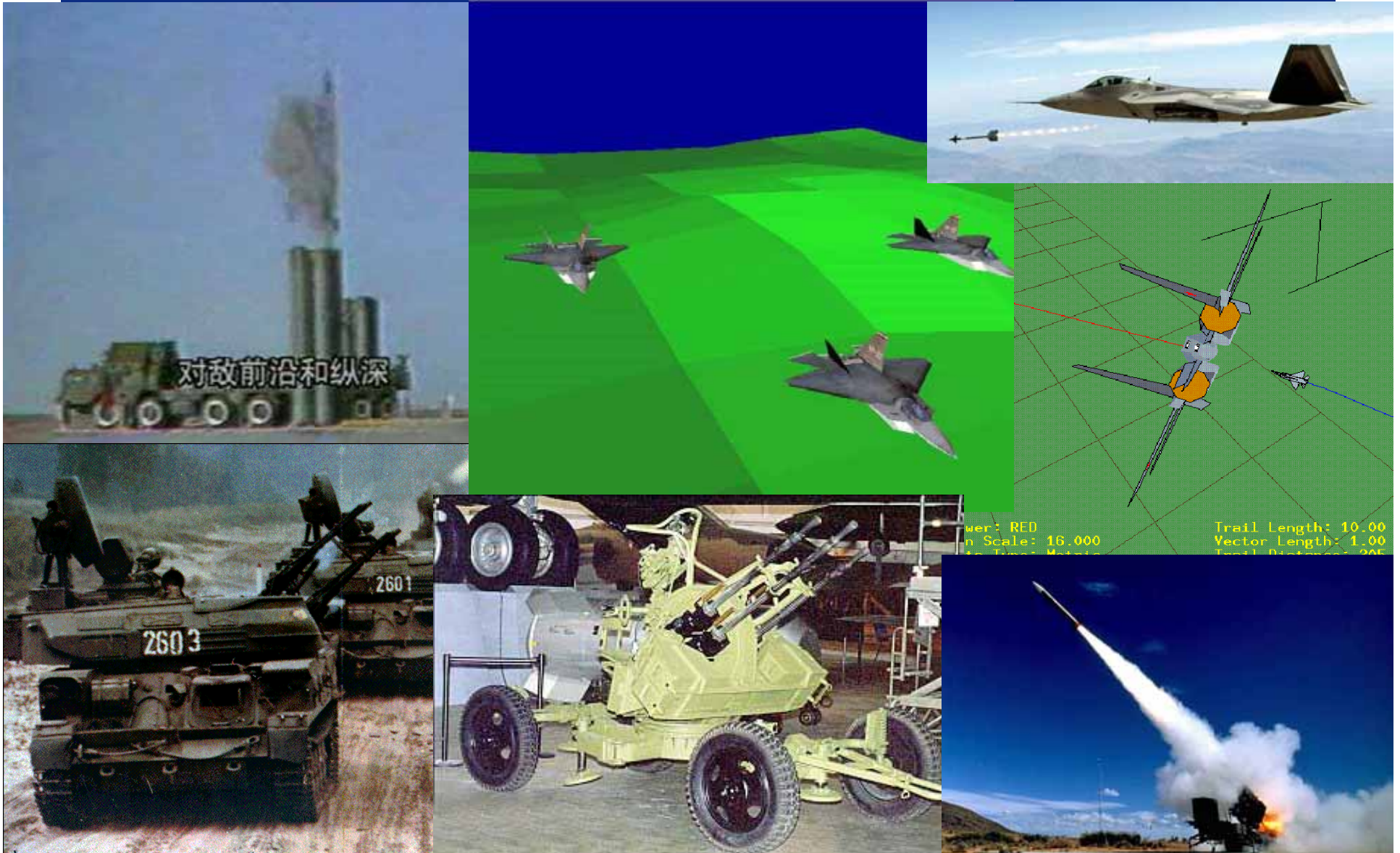




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# Engagement-Level

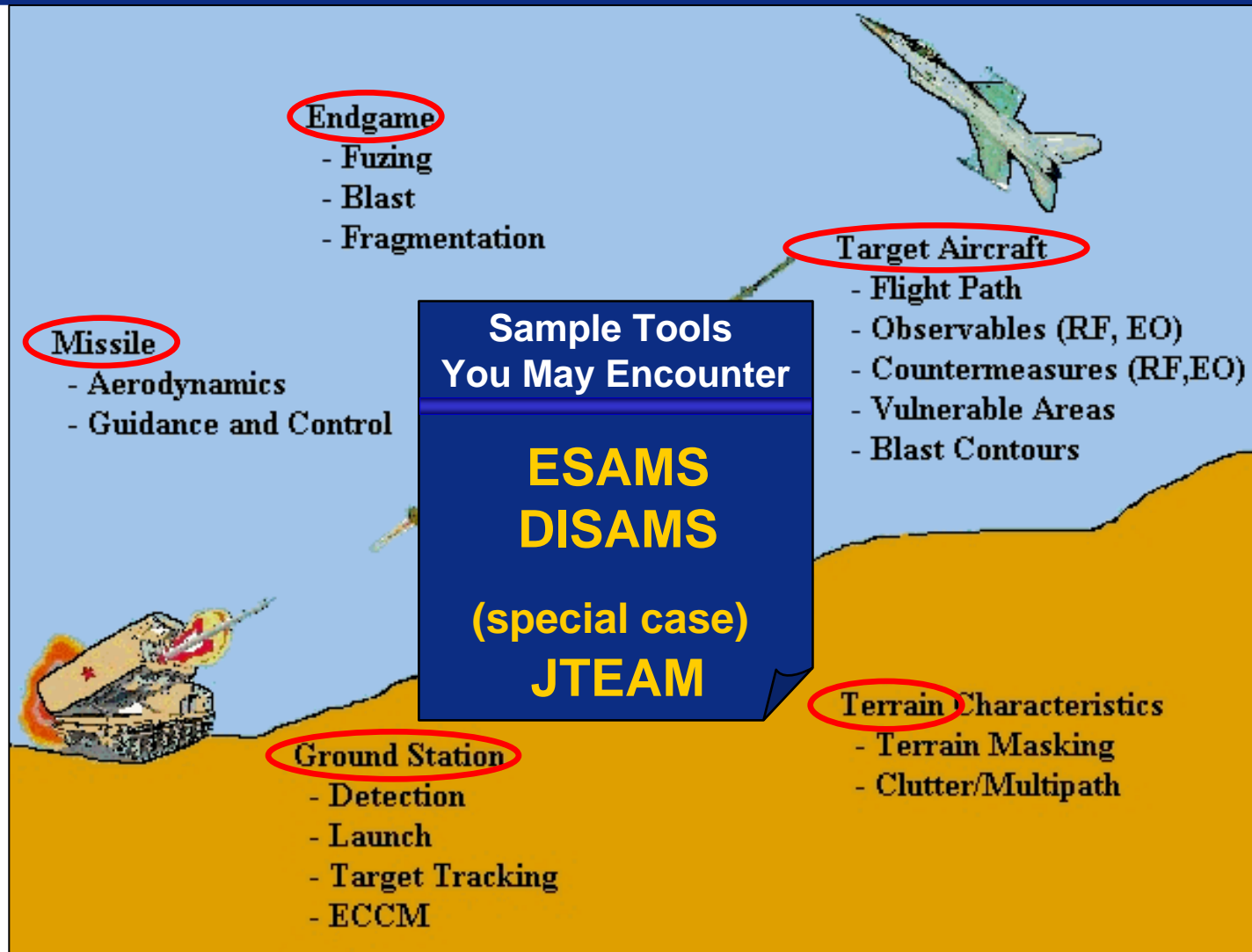
## *Aggregating Engineering-Level to Few-v-Few*





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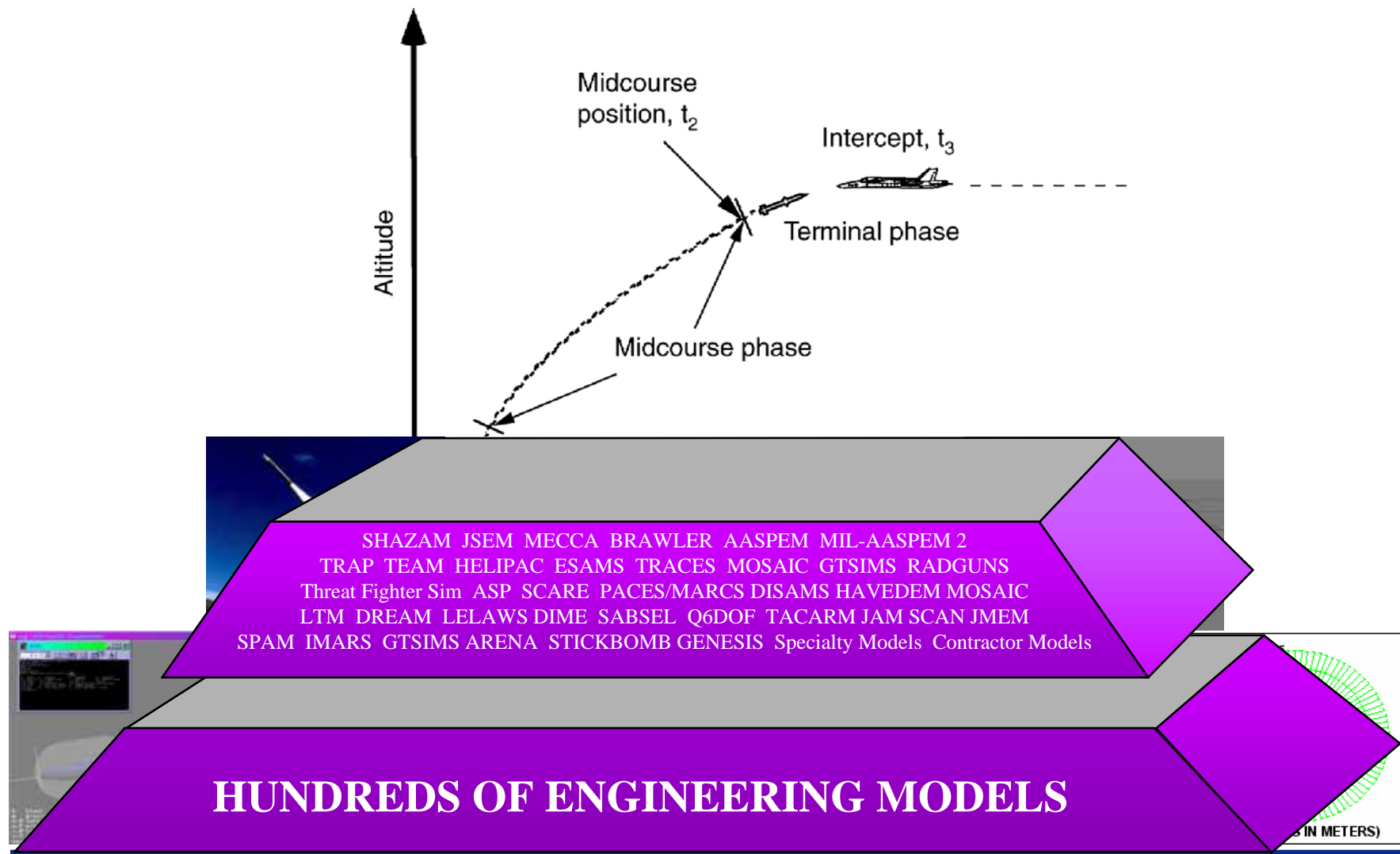
# Engagement-Level Surface-to-Air Missile





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# Engagement-Level *Few-v-Few Summary*



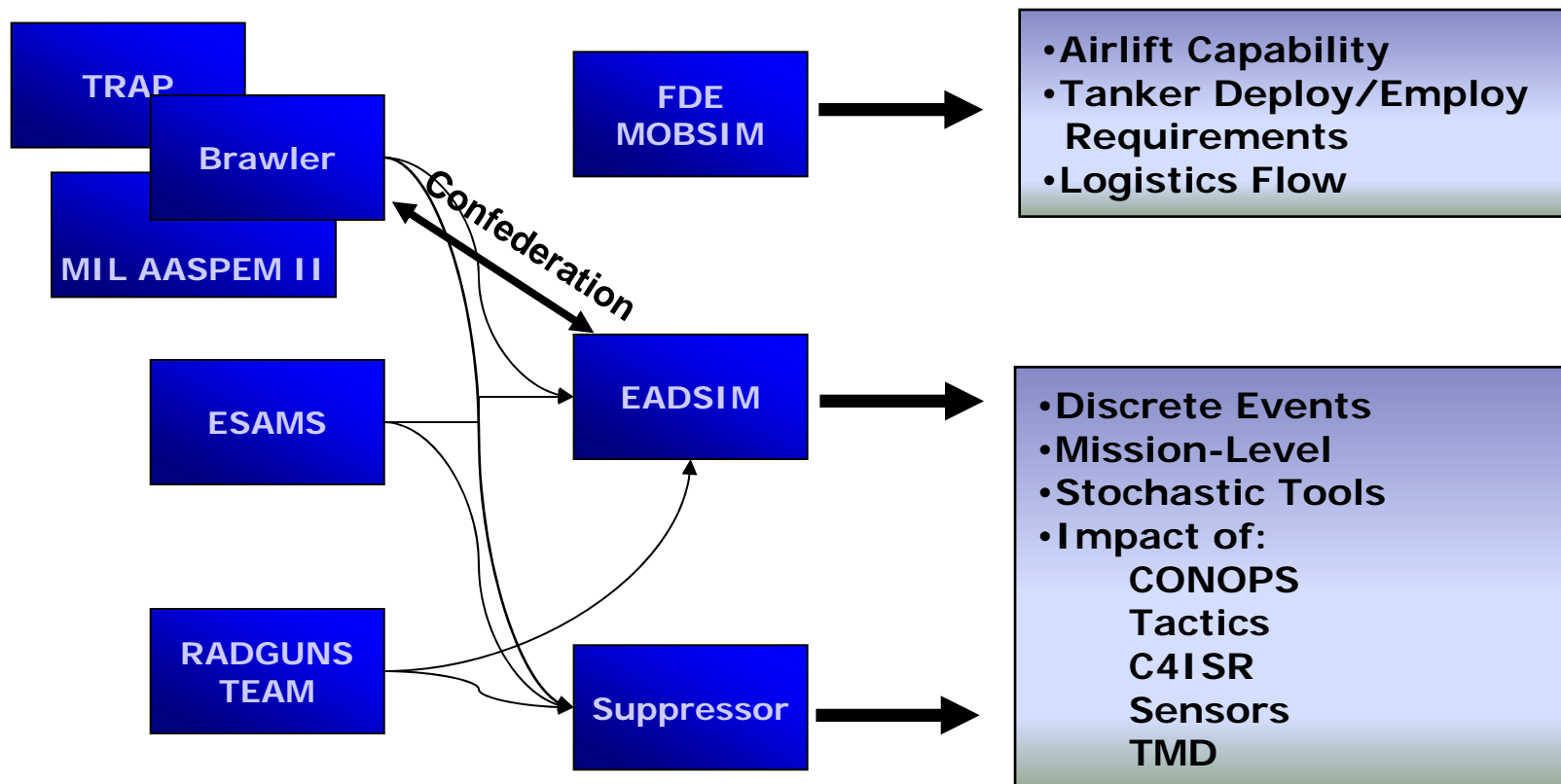




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# Survivability & Vulnerability:

## *Impacts on Mission Level Analysis*



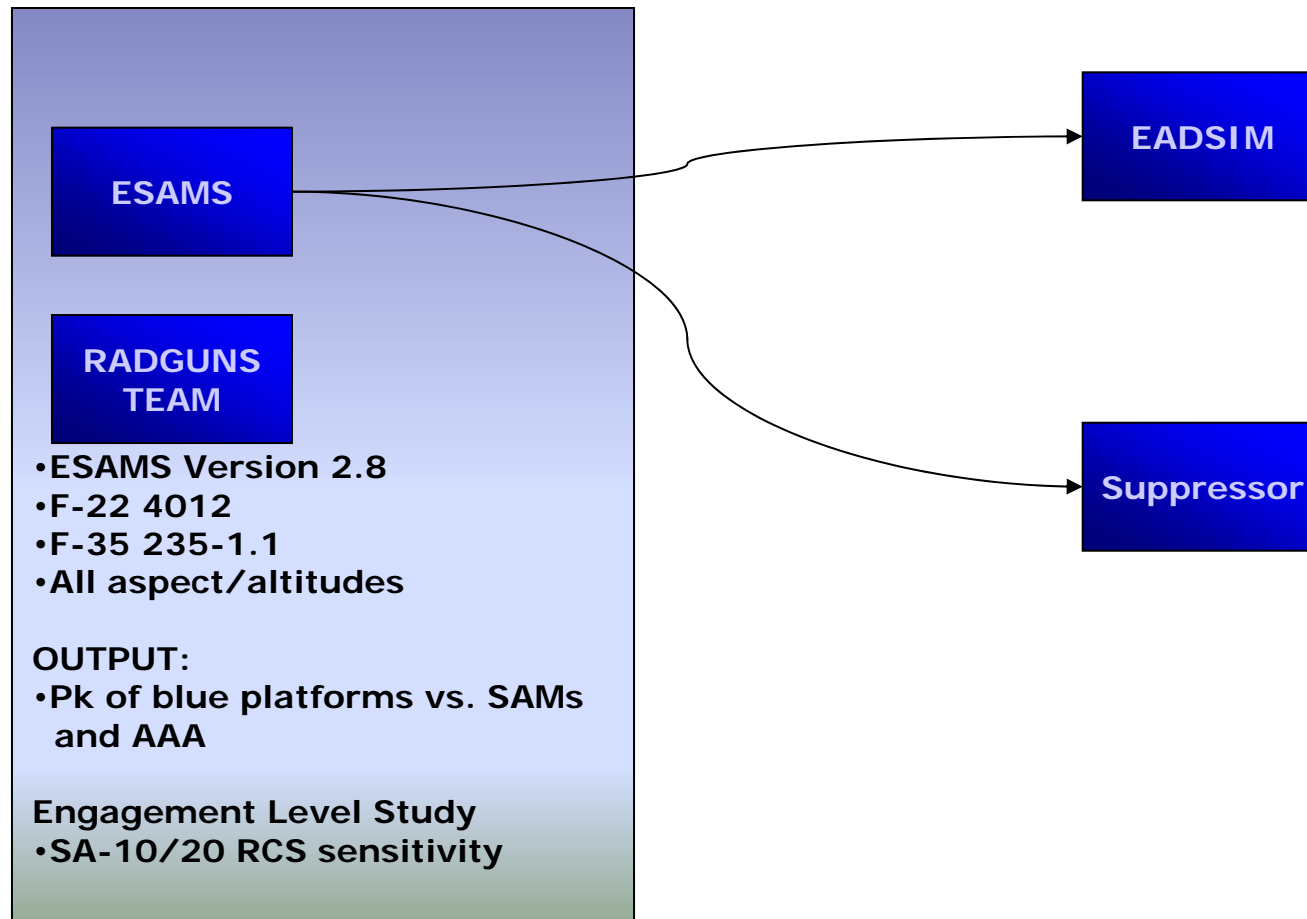
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# ESAMS, RADGUNS and JTEAM

*Input to EADSIM & Suppressor*



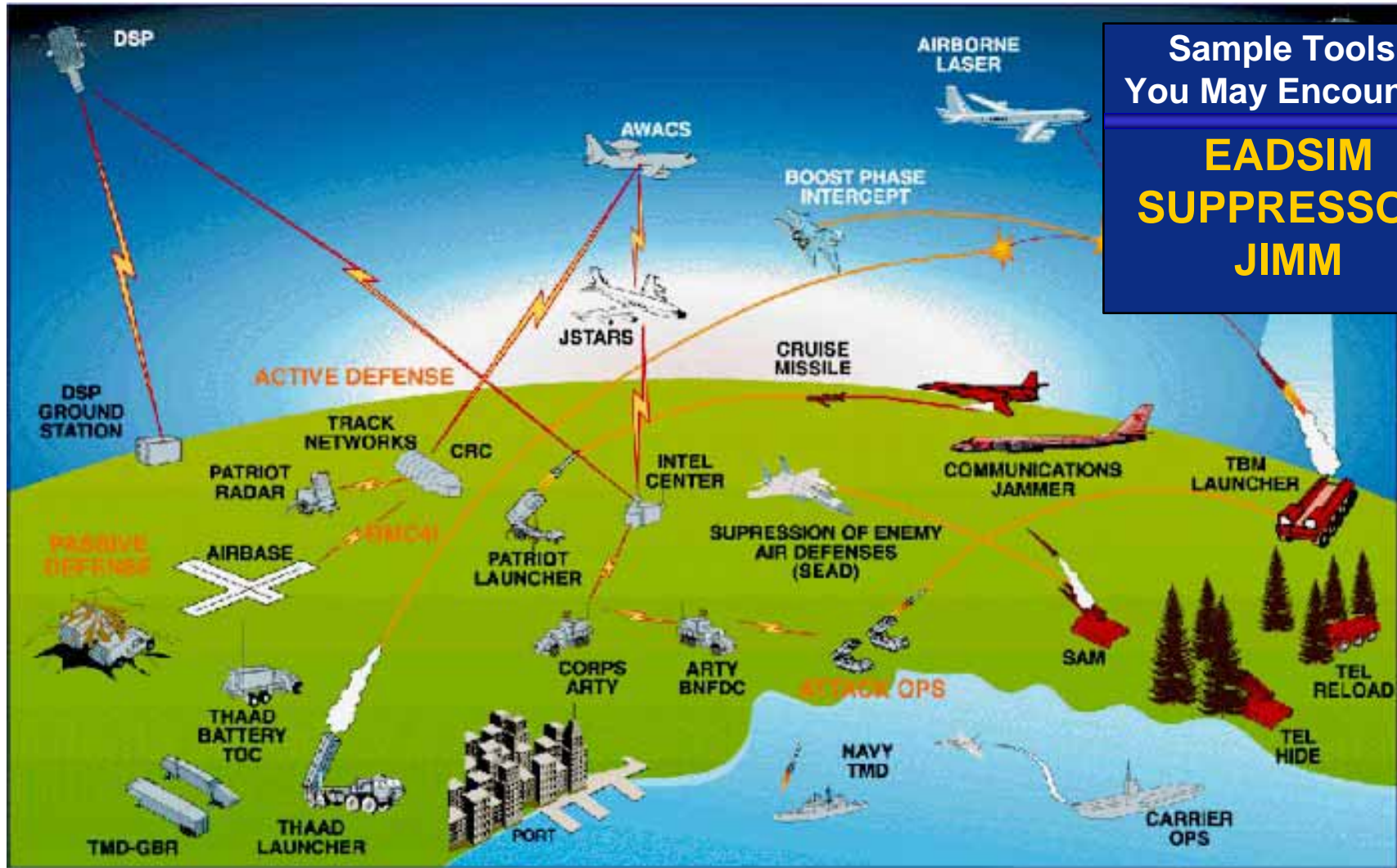
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# Mission-Level

## *Many-on-Many*



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EADSIM



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# Mission-Level *Many-v-Many Summary*



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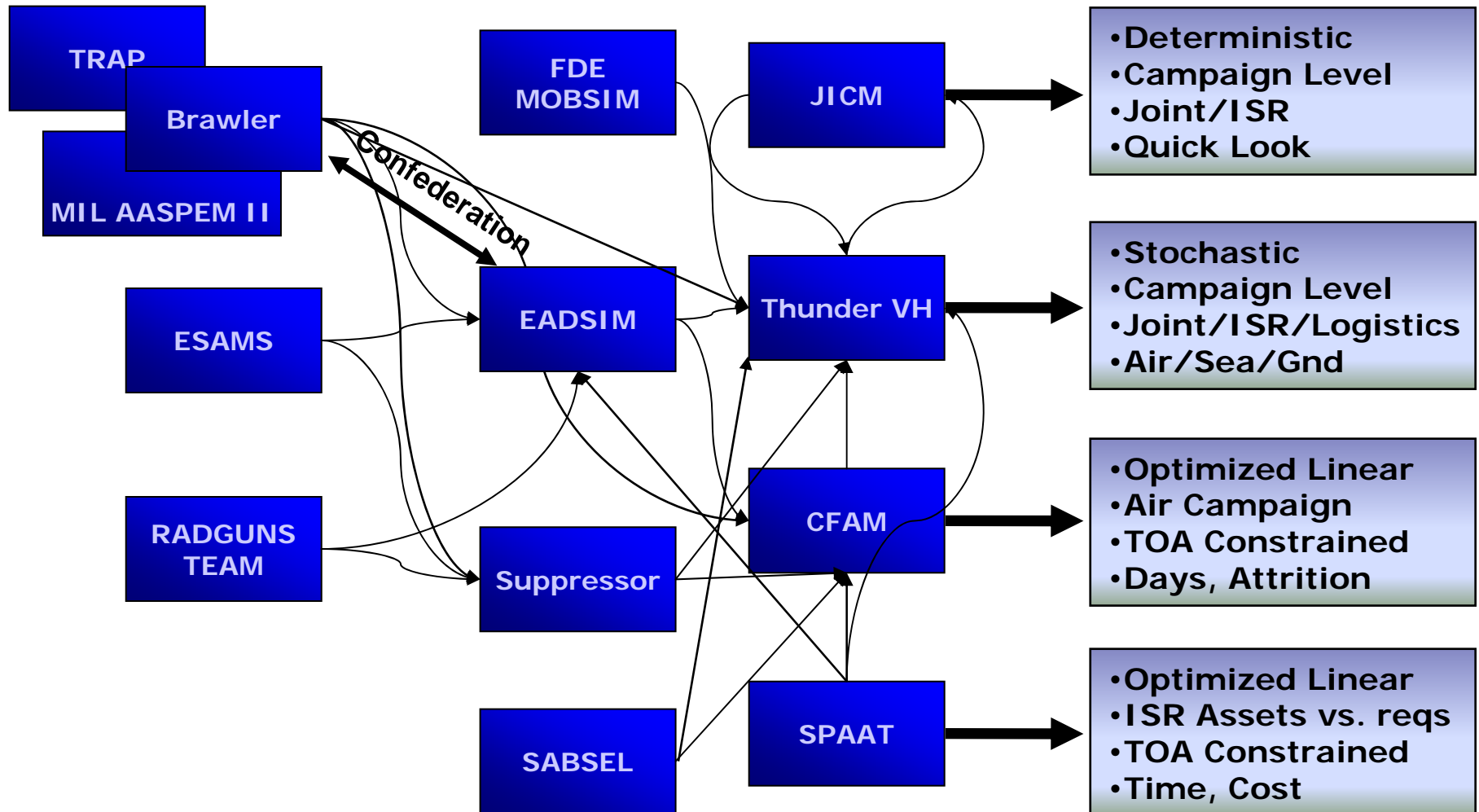
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# Survivability & Vulnerability:

## *Impacts on Campaign Level Analysis*



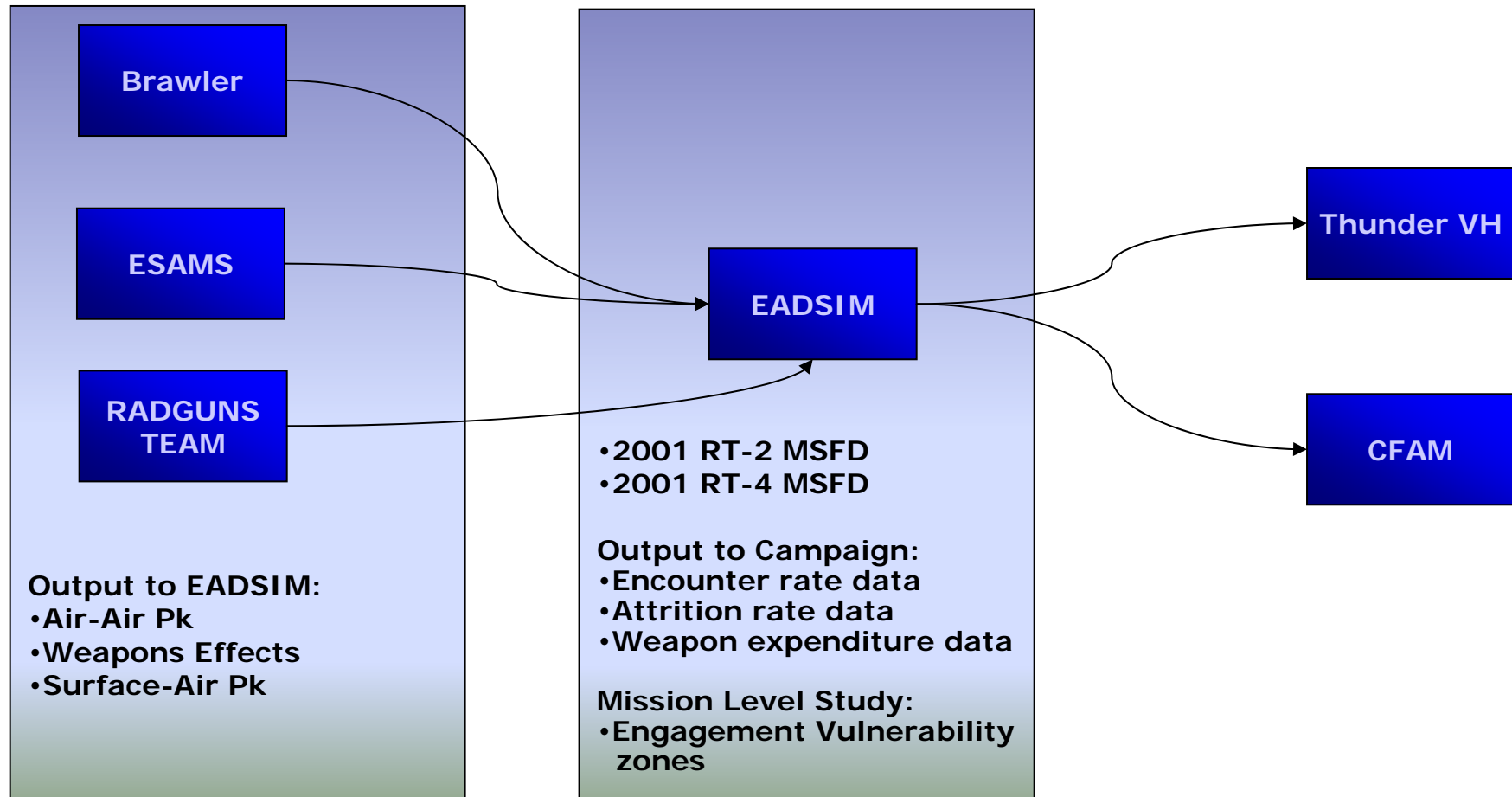
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# EADSIM

*Input to THUNDER & CFAM*



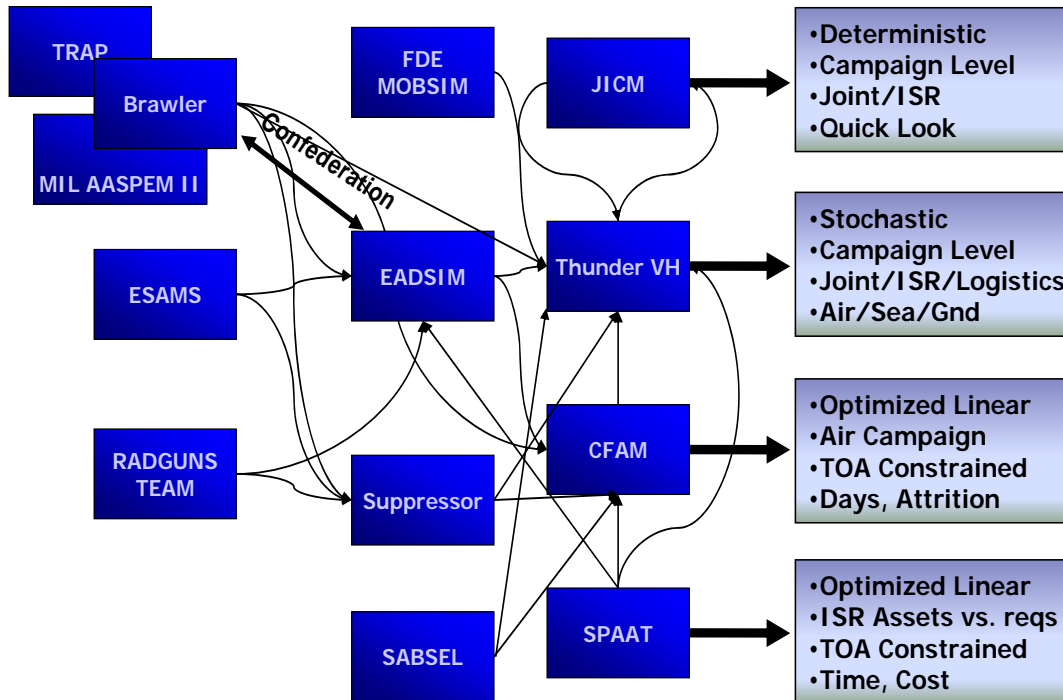
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# S&V Impact Analysis

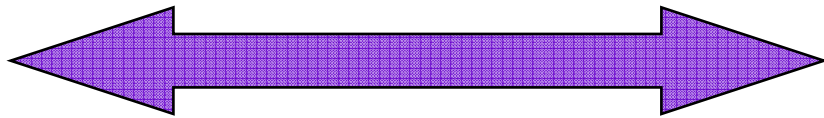
## Consistent Scenario, CONOPS & Data Set



To answer high level questions to show the impact of S&V, Analyst must use

- Same scenario
- CONOPS
- Data sets

for all levels of M&S and data generation.



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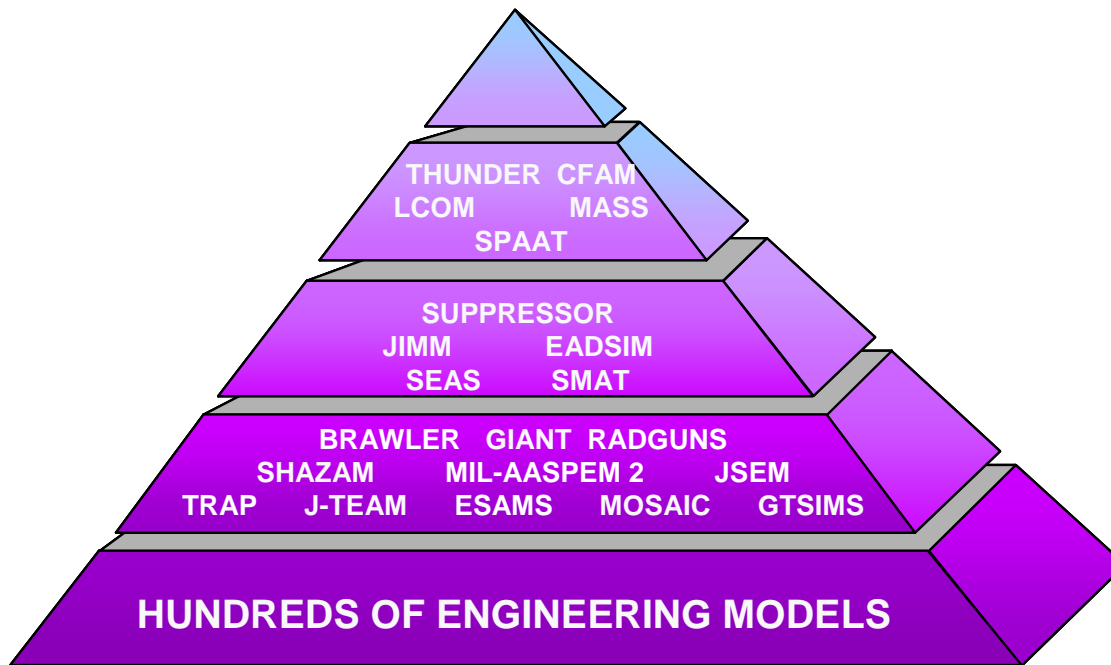




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# AFSAT Value Added *Summary*

- AF Analytic Community approved set of M&S
- Ability to demonstrate impacts at mission and campaign levels



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# *Back Up Slides*

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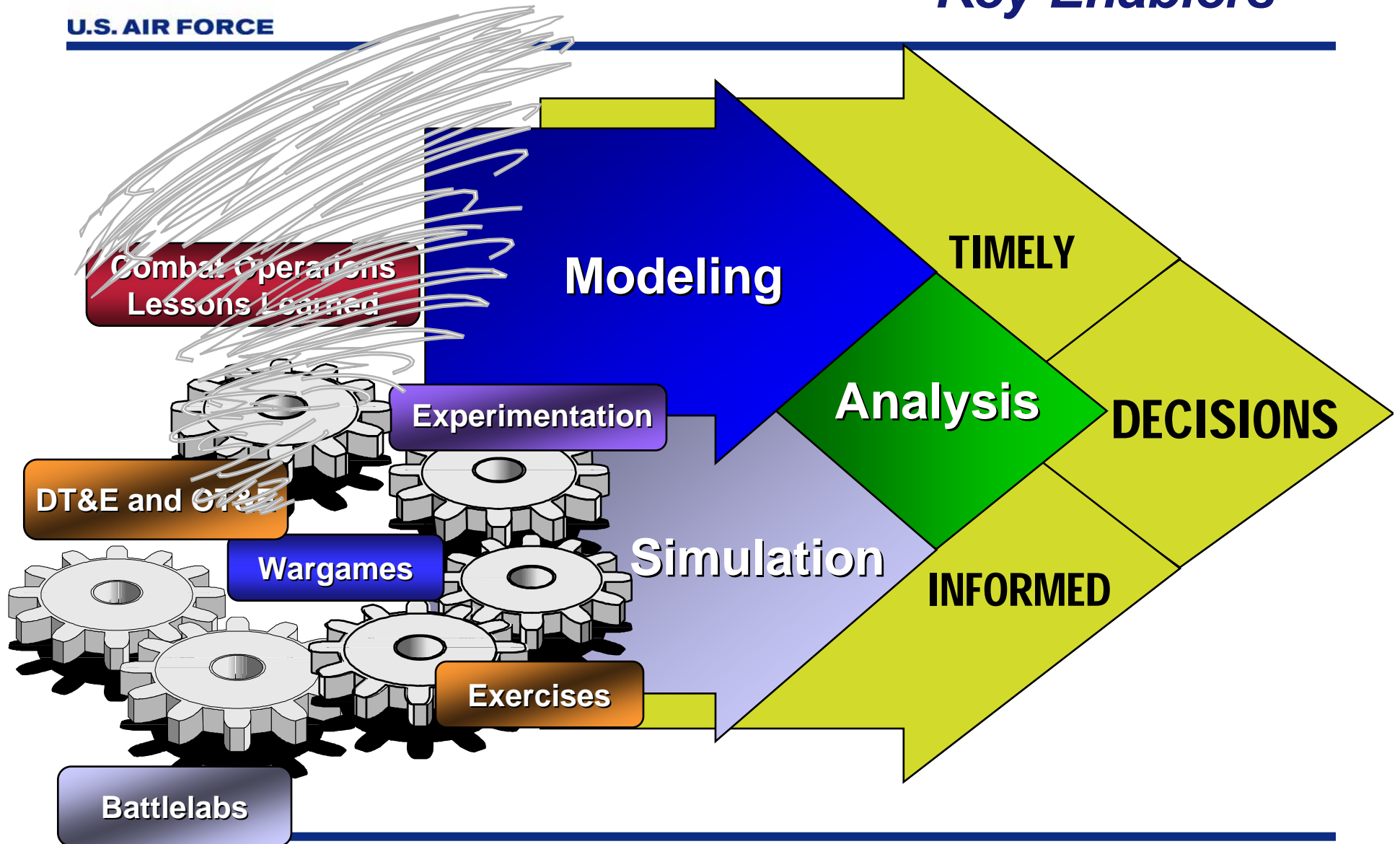
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# Capability-Based Decisions

## Key Enablers



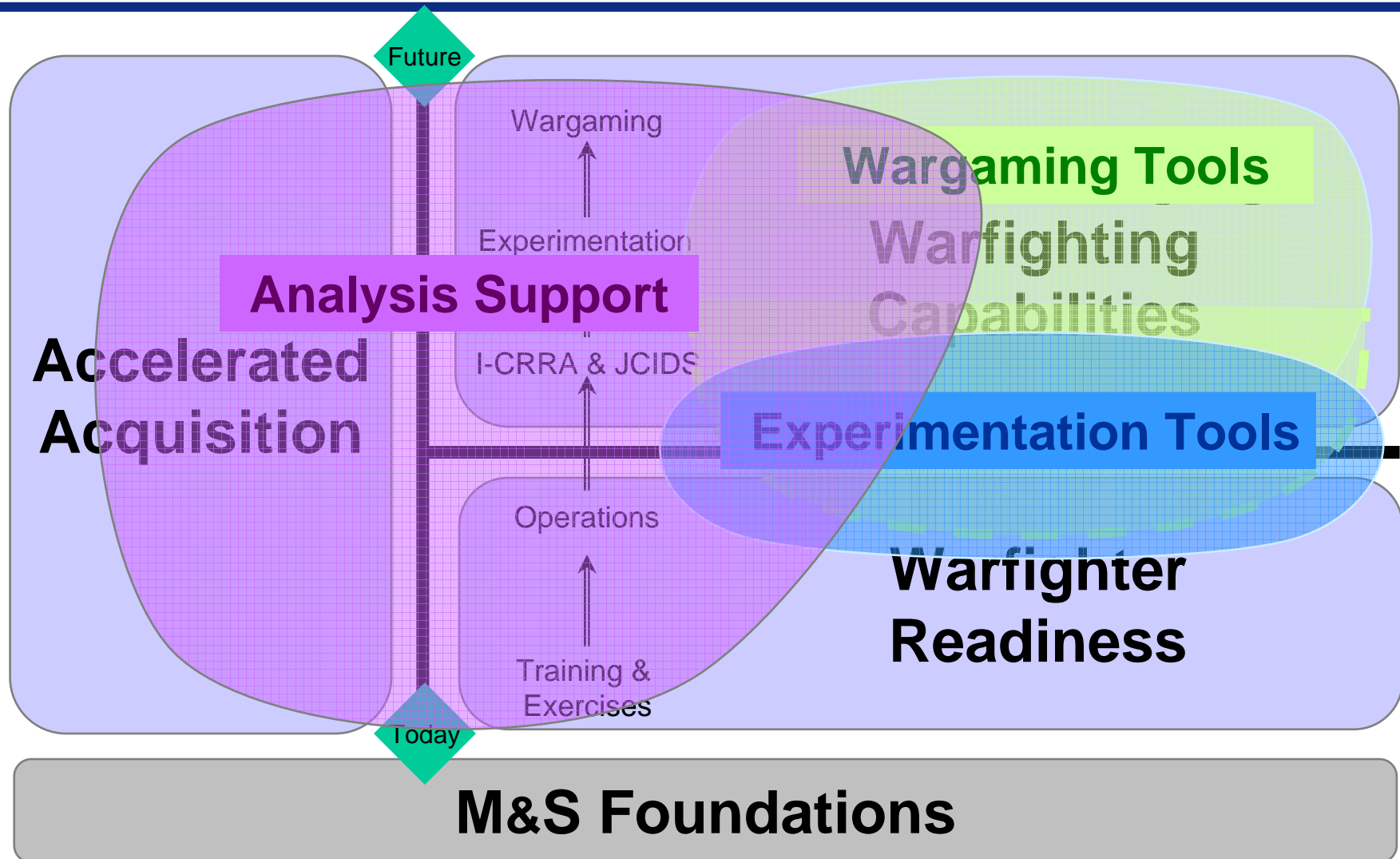
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# NEWC IPT AOR



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